What is claimed is:

1. A method of firmly joining a sensor workpiece to a body component, in which the sensor workpiece (1) which comprises a sensor material, is positioned on a body component surface region (3) of the body component (2) and is firmly joined to the body component, which method comprises the steps of:

a) firstly, laminating an adhesive layer (5) which is provided by a cross-linked transfer contact adhesive to a sensor contact surface (4) of the sensor workpiece (1);

b) then, by using known radiation methods, transferring geometric patterns of a plurality of galleries (6) to be arranged in a laminar fashion to the sensor contact surface (4) by a light beam that penetrates the transfer contact adhesive, which are subsequently introduced into the sensor workpiece (1) and, in the process, are removed congruently with the structures of the adhesive layer (5) introduced into the sensor workpiece (1);

c) subsequently arranging the adhesive-laminated patterned sensor contact surface (4) on a defined surface region of the body component surface (3); and

d) subsequently exerting a mechanical pressure on the two joint partners, by which the adhesive-laminated patterned sensor contact surface (4) and the body component surface region (3) are pressed together.

2. The method as claimed in claim 1, wherein, according to step a), the adhesive layer (5) is implemented with a defined constant layer thickness, which is laminated onto the sensor contact surface (4).

3. The method as claimed in claims 1 and 2, wherein step a) is preceded by unrolling the transfer contact adhesive from a transfer roll, which is supplied to a manual laminating roll, so that after that the lamination of the adhesive layer (5) is

implemented with said manual laminating roll with which the adhesive layer (5) is rolled on to one side of the sensor workpiece (1) under slight contact pressure in such a way that air bubble inclusions between the sensor contact surface (4) and the transfer contact adhesive are prevented.

4. The method as claimed in claim 3, wherein with a step e) the laminating operation is repeated with an electrically operated laminating device, in which the transfer contact adhesive is unrolled from the transfer film with a defined rolling speed to the electrically operated laminating device and is then rolled on under a defined contact pressure (8) in such a way that an essentially homogeneous adhesion between the transfer contact adhesive and the sensor contact surface (4) is achieved.

5. The method as claimed in claim 4, wherein with a subsequent step f), the sensor workpiece (1) with the adhesive-laminated patterned sensor contact surface (4) is then subjected to annealing in a drying cabinet, by which means the adhesion is maximized.

6. The method as claimed in claim 1, wherein step b) is implemented by using laser lithography in such a way that the geometric patterns of the plurality of galleries (6) are transferred to the adhesive-laminated sensor contact surface (4) directly from a movable laser source by means of a controllable laser beam and are introduced three-dimensionally into the sensor workpiece (1), or are projected onto the adhesive-laminated sensor contact surface (4) indirectly, with the interposition of masks.

7. The method as claimed in claim 6, wherein a geometric pattern of the galleries (6), which will correspond to a vacuum and/or an air gallery, is transferred.

8. The method as claimed in claim 7, wherein a cross section of a respective gallery of the plurality of galleries generally corresponds to that of a body of rotation which ends rectilinearly at the sensor contact surface (4), which is preferably implemented with a parabolic form whose parabola opens toward the sensor contact surface (4), or a square or rectangular form, the gallery cross section being cut out from the sensor contact surface (7) so as to extend rectilinearly; wherein the plurality of galleries consists of at least one of a vacuum gallery and an air gallery.

9. The method as claimed in claim 6, wherein a removal depth (t) of the laser beam passing through the transfer contact adhesive and penetrating into the sensor workpiece (1) is varied on the basis of its intensity and a speed of travel of the laser source.

10. The method as claimed in claim 2 or 6, wherein the laser source is displaced three-dimensionally and the transfer contact adhesive is laminated to the sensor contact surface (4) with a freely selectable layer thickness by means of tracking the laser source to the adhesive application and/or bringing the laser source up to the adhesive application.

11. The method as claimed in claim 1, wherein before step c) coarse and/or fine cleaning of the body component surface region (3) is carried out.

12. The method as claimed in claim 1, wherein step d) is implemented with a clamping device by means of whose external clamping of the two joint partners, a defined contact pressure (8) is transferred to the contact surfaces of each joint partner, whose front faces are opposite one another, and to the adhesive layer (5) layered in between, in such a way that an even contact of the sensor workpiece (1) is loaded uniformly over its contact surface (4).

13. The method as claimed in claim 1, wherein before step d) the plurality of galleries are closed in an airtight manner on one side and, on the other side, are connected to a vacuum device and a vacuum is then generated within the plurality of galleries.

14. The method as claimed in claim 12 or 13, wherein, by using the clamping device and the vacuum device, the contact pressure (8) is increased up to a defined vacuum, which is maintained for at least ten minutes.

15. A vacuum sensor for Structural Health Monitoring, comprising a body component (2), at which a sensor workpiece (1) is positioned within a defined region of an even surface region of the body component and is firmly joined to the body component (2), which sensor workpiece is provided with an adhesive layer (5) laminated onto an even contact surface (4) of the sensor workpiece (1) and which adhesive layer (5) is arranged on the contact surface (4) so as to be distributed essentially homogeneously, wherein geometric patterns of a plurality of galleries (6) which are arranged lying beside one another in a laminar fashion are introduced into the sensor workpiece (1) and are removed congruently with the structures of the adhesive layer (5) introduced into the adhesive-laminated sensor workpiece (1).

16. The vacuum sensor as claimed in claim 15, wherein a respective gallery of the plurality of galleries (6) is implemented with a removal depth (t) which is limited by a body component surface region (3) of the body component (2) and is continued into the sensor workpiece (1).

17. The vacuum sensor as claimed in claim 15, wherein the plurality of galleries (6) are machined into the sensor workstation (1) with a different type of geometric configuration and a different gallery cross section.

18. The vacuum sensor as claimed in claim 15, wherein the plurality of galleries (6) are machined into the sensor workpiece (1) with an essentially uniform geometric configuration and with an essentially uniform gallery cross section.

19. The vacuum sensor as claimed in claim 18, wherein the essentially uniform gallery cross section is implemented with a parabolic cross-sectional form, an opening of the parabola ending with the contact surface (4) of the senor workpiece (1).

20. The vacuum sensor as claimed in claim 18, wherein the essentially uniform gallery cross section is implemented with a triangular cross-sectional form, an opening of the triangle, which is arranged opposite an angle formed by two sides of the triangle, ending with the sensor contact surface (4) of the sensor workpiece (1).

21. The vacuum sensor as claimed in claim 20, wherein the triangular cross-central form is implemented with the configuration of an equilateral triangle.

22. The vacuum sensor as claimed in claim 15, wherein the essentially uniform gallery cross section is implemented with a trapezoidal cross-sectional form, an opening of the trapezium, which is arranged opposite the top surface of the trapezium, ending with the contact surface (4) of the sensor workpiece (1).

23. The vacuum sensor as claimed in claim 17 or 18, wherein a geometric configuration of a respective gallery of the plurality of galleries is machined into the

sensor workpiece (1) with a non-square or non-rectangular gallery cross section which is comparable with a non-cylindrical longitudinal section.

24. The vacuum sensor as claimed in claim 23, wherein a three-dimensionally variable gallery cross section is machined into the sensor workpiece (1).

25. The vacuum sensor as claimed in claim 15, wherein the plurality of galleries (6) which are removed congruently from the sensor workpiece (1) and the adhesive layer (5) are implemented by using known radiation methods, preferably with the aid of laser lithography, by using a light beam, preferably a laser beam.

26. The vacuum sensor as claimed in claim 15, wherein, by using the sensor workpiece (1), which is box-like or layer-like and whose sensor contact surface (4) is square or rectangular, and the adhesive layer (5), whose adhesive surface is square or rectangular and is layered virtually congruently with the contact surface (4) of the sensor workpiece (1), a layer structure is implemented in which a first layer thickness (a) of the sensor workpiece (1) is greater than a seond layer thickness (b) of the adhesive layer (5).

27. The vacuum sensor as claimed in claim 25 or 26, wherein account is taken of an arrangement of the plurality of galleries (6) with a gallery architecture according to which a course of a respective gallery of the plurality of galleries (6) is implemented essentially parallel with the sides or the longitudinal or broad side or extending transversely with respect to the congruently located layers of the layer structure, without gallery crossing.

28. The vacuum sensor as claimed in claim 26, wherein the adhesive layer (5) is implemented essentially uniformly and with a low layer thickness (b).

29. The vacuum sensor as claimed in claim 28, wherein the second layer thickness (b) of the adhesive layer (5) is implemented with a thin layer application.

30. The vacuum sensor as claimed in claim 28, wherein the adhesive layer (5) is implemented with a contact adhesive, preferably a transfer contact adhesive that can be laminated.

31. The vacuum sensor as claimed in claim 30, wherein the adhesive layer (5) is implemented with a cross-linked transfer contact adhesive with a low tendency to creep, which is capable of implementing adhesion between the contact surface (4) of the sensor workpiece (1) and the body component surface region (3) of the body component (2).

32. The vacuum sensor as claimed in claims 30 and 31, wherein the transfer contact adhesive is adapted for developing, on the contact surfaces of the sensor contact surface (4) and of the body component surface region (3), a dynamic-mechanical and homogeneous adhesion which is implemented with an adhesive force of 20 – 50 N/25 mm.

33. The vacuum sensor as claimed in claims 15 and 30 to 32, wherein the transfer contact adhesive is an adhesive which can be unrolled from a transfer roll with a defined and constant second layer thickness (b) and is suitable for being nondetachably joined to the body component surface region (3) of the body component (2), which is implemented under the influence of a defined and reproducible contact pressure acting on the two joint partners.

34. The vacuum sensor as claimed in claims 28 and 30, wherein the contact adhesive is preferably an acrylate contact adhesive, which is used with a second layer thickness (b) of about 25 μm.

35. The vacuum sensor as claimed in claim 31, wherein the sensor material of the sensor workpiece (1) is a polymer material.

36. The vacuum sensor as claimed in claim 35, wherein the polymer material is preferably implemented with a polyimide.

37. The vacuum sensor as claimed in claim 36, wherein the polyimide is a Kapton film, which is implemented with a film thickness of about 125 μm.

38. The vacuum sensor as claimed in claim 25, wherein the laser beam used is a pulsed excimer laser beam, which is aimed at the adhesive-laminated sensor workpiece (1) with a pulse energy of 400 mJ.

39. The vacuum sensor as claimed in claim 38, wherein the laser beam is set on the sensor contact surface (4) at various angles of attack, preferably vertically on the sensor contact surface (4).

40. The vacuum sensor as claimed in claim 39, wherein the angle of attack is based on an angular range from -45° to +45° which the laser beam forms with the contact surface (4).

41. The vacuum sensor as claimed in claims 15, 25 or 30, wherein the transfer adhesive of the adhesive layer (5) has the capability under the influence of the penetrating light beam, of cutting out the transfer contact adhesive with the passage

cross section of the light beam at the point of passage of the light over the second layer thickness (b) of the transfer adhesive as a result of residue-free adhesive evaporation without microscopic adhesive residue.

42. The vacuum sensor as claimed in claim 15, 16 or 18, wherein the gallery depth of those galleries (6) of essentially uniform geometric configuration, correlating with the removal depth (t), is implemented with about 100 µm, which is subsumed by the layer thickness (b) of the adhesive layer 5 and which is determined within the depth of the relevant gallery (6) removed from the sensor workpiece (1).

43. The vacuum sensor as claimed in claim 42, wherein the depth of the relevant gallery (6) removed within the sensor workpiece (1) is implemented with 75 µm.

44. The vacuum sensor as claimed in claim 15, wherein the material of the body component (2) is an appropriate metal, a metal laminate or a composite material.

45. The vacuum sensor as claimed in claim 44, wherein surfaces of the metallic workpiece are coated with a layer of bonding primer or ink.

46. The vacuum sensor of claim 15, wherein the vacuum sensor is a vacuum sensor application.

47. A vacuum sensor application for Structural Health Monitoring, comprising a body component (2), on which a sensor workpiece (1), to which an adhesive layer (5) is laminated onto an even sensor contact surface (4) and is placed thereon so as to be distributed homogeneously, is positioned within a defined region of an even body component surface and is nondetachably joined to the body component (2), wherein geometric patterns of a plurality of first galleries (61) of essentially uniform

configuration with a first gallery cross section (A1) and a first removal depth (t1), which are arranged lying beside one another in a laminar fashion, and the geometric patterns of a plurality of second galleries (62) of uniform configuration with a second gallery cross section (A2) and a second removal depth (t2) are introduced into the sensor workpiece (1), the first and second galleries (61, 62) in each case being removed along a removal axis (x) which is essentially perpendicular to a sensor workpiece surface (8), and the first removal depth (t1) being greater than the second removal depth (t2) and the second gallery cross section (A2) being greater than the first gallery cross section (A1), and the geometric pattern of the individual second gallery (62), in each case with the structure of the adhesive layer (5) introduced into the adhesive-laminated sensor workpiece (1), being removed along said removal axis (x) with a third removal depth (t3) which corresponds to the thickness of the adhesive layer (5).

48. A vacuum sensor application for Structural Health Monitoring, comprising a body component (2), on which a sensor workpiece (1), to which an adhesive layer (5) is laminated onto an even sensor contact surface (4) and is placed thereon so as to be distributed homogeneously, is positioned within a defined region of an even body component surface and is nondetachably joined to the body component (2), wherein the geometric patterns of a plurality of first galleries (61) of uniform configuration with a first gallery cross section (A1) and a first removal depth (t1), which are arranged lying beside one another in a laminar fashion, are introduced into the sensor workpiece (1), the first galleries (61) in each case being removed along a removal axis (x) which is perpendicular to a sensor workpiece surface (8), and the geometric pattern of the individual first gallery (61), in each case with the structure introduced into the adhesive-laminated sensor workpiece (1), being removed in a stepped manner along said removal axis (x) with a third removal depth (t3), which corresponds to the thickness of the adhesive layer (5), and a third gallery cross

section (A3), the third removal depth (t3) being less than or equal to or greater than the first removal depth (t1), and the third gallery cross section (A3) being greater than the first gallery cross section (A1).